Capstone Phase II
Avionics Installation Program
Report E-1
Comprehensive Installation Plan for Capstone Avionics

November 22, 2002

I. Recommended Strategic Approach

A. Operator Interviews and Conclusions

A second set of operator interviews was conducted, including site visits to all of the largest Southeast Alaska operators during the week of August 12, 2002, and meetings with avionics installers in Anchorage during the week of August 19, 2002. (See Appendices D, E, and F for the documents presented at these meetings describing Operator Benefits, Avionics Systems Description, and Avionics Configuration, and Appendix G for a summary of these operators). Based on these interviews and meetings, and discussions with FAA staff, the facts bearing on the recommended strategic approach for the Capstone Phase II avionics installation are as follows:

- Almost all of the larger Southeast Alaska commercial operators have decided to participate in Capstone Phase II, the major exception at this time being ERA Helicopters. See Appendix B for a list of decisions of the operators interviewed.

- The operators are impressed with the progress that the Capstone Program has made since April (e.g., the FAA decisions that will lead to the issuance of the new low-altitude IFR procedures in January, 2003), and are not dismayed by the expected 90-day delay in commencement of installations (from November 2002 to February 2003).

- The FAA's written answers to the questions posed by the operators in April, that were provided on the Capstone website's Frequently Asked Questions (FAQ), and which were provided in hardcopy to the operators, have generally been adequate. In addition, they particularly liked the changes made in the avionics to increase terrain data resolution and to incorporate a hydrographic database for the waterways. Even where the FAA's answer was not what the operators had hoped for (e.g., the disapproval of toggling a single screen between the PFD and ND displays), the fact that there was a reasoned, written FAA answer was satisfactory to them. There are a few questions that were not adequately answered, and some new questions arose in these meeting. (See Appendix A for the questions that were raised during this set of interviews, which should be answered and added to the FAQ information on the Capstone website.)

- The operators' knowledge of the Capstone Phase II program has increased (in part through our individualized demonstrations of the avionics operation and capabilities), and this has increased their comfort level in participating.

- The panel pictures of real instrument panels of Southeast Alaska aircraft showing all of the configuration options for installations in each of the major categories of aircraft, and the detailed discussions regarding the installation in many specific aircraft, have resulted in a convergence on their decision to participate and the typical panel configuration that will be selected.

- There were extensive discussions about the likely reliability of the avionics (and existing electrical systems), the rigor of the avionics hardware and software testing, the weight savings through removal of old instruments, spares availability at their bases, MELs, operator maintenance personnel training, and other methods of minimizing airplane-on-

the-ground problems due to avionics failure. These discussions have resulted in much greater acceptance of complete, or nearly complete, replacement of the existing flight instruments in their aircraft. Some additional discussion on this issue would be helpful, however, because this has one of the largest potentials for loss to the operators caused by participation in the program. These discussions should include all of the locations of spares and the procedures for getting ferry permits to locations where spares can be installed.

- The operators see a potential benefit in the delayed installation start, because it will limit total installations during the winter of 2002-03, and thereby provide a "trial period" with a limited number of installed aircraft. This trial period can be used to discover and address any bugs in the installations, avionics, or other Capstone elements over the 2003 summer season, before entire fleets are installed in the winter of 2003-04.

- The directors of maintenance of the operators want to be involved in the installation process. In part this is because many of them have done much of the work on the existing panels and are planning the new Capstone panels, which many see as an opportunity to generally upgrade and standardize the panels on their entire fleet. They also want to be involved because, unlike Capstone Phase I, they will not be selecting a familiar avionics installer, and the prime contractor selected by FAA is likely to be an unknown entity with unknown personnel from outside Alaska -- and they want to be there to protect their aircraft. In addition, they want to be familiar with the installation for later troubleshooting and unit replacement purposes.

- Operators expressed a desire to take the opportunity of the Capstone installations to standardize their instrument panels. To the extent possible, the panels should be the same for each operator's entire fleet.

B. Constraints and Assumptions

It appears that the following constraints and assumptions apply to the Capstone Phase II avionics installation program.

- Chelton will begin providing all of the avionics for its system (all but the ADS-B UAT units), including the units of its subcontractors Free Flight, Crossbow, and Shadin, and custom cables, antennas, and trays for these units, to the installation contractor in February 2003. The new ADS-B UAT vendor will begin providing trays and cables for their cockpit control unit and UAT unit in February 2003, with the UAT avionics delivered beginning in the fall of 2003.

- The Chelton delivery schedule is to provide 20 ship sets in February 2003 and 35 each month thereafter until 200 ship sets are delivered (assuming the FY 2003 appropriation provides the requested funding for the second 100 units).

- The UAT trays and cables will be provided at least at the same monthly rate as the Chelton systems, so that installations of all Chelton systems and all UAT trays and cables will be made concurrently.

- There will be at least sufficient UAT units on hand in February 2003 to provide test units for the integrated Capstone systems before they are completed.

- The avionics installation prime contractor will be headquartered outside of Southeast Alaska and will have to bring the technician workforce into Southeast for this job. Whether they are brought to Juneau, Ketchikan, Sitka or Skagway will not greatly affect the cost of this relocation.

- Few, if any, aircraft will be installed during the summer months (from April 15 to October 1). Based on estimates of installation time for the various configurations, "production" installations, i.e., non-prototype installations that are conducted by experienced crews, will take from 7 days (VFR) to 14 days (IFR), with prototype installations taking twice this long.

- Based on the priority system described below, IFR aircraft will be given priority and at least some will be installed in the spring of 2003. IFR installations will be the most time consuming, averaging 14 days, with prototype IFR installations taking an estimated 4 weeks. Therefore, the first installations will be by far the most time consuming. Coupled with the late start on the installations, this will further reduce the total number of installations completed before the 2003 summer season.

C. Priority Ranking

The priority of installations should be established to meet the following goals:

1. Maximize long-term safety in Southeast Alaska by enabling the new Capstone II low-altitude IFR procedures and encouraging the transition from VFR to IFR aircraft and operations. Achievement of this goal would be measured by an increase in the estimated IFR hours in the Capstone II region (Southeast Alaska from Yakutat to the Canadian border at Prince Rupert), once FAA implements the planned low-altitude IFR infrastructure in the Juneau area. For this reason, IFR hours flown by an aircraft in Southeast Alaska should be weighted more heavily (e.g., by a factor of two or three) than VFR hours in Southeast Alaska in establishing installation priority. In addition, one of the first Southeast Alaska airplanes installed should be an IFR airplane, to make clear that IFR aircraft are a priority.

2. Maximize short-term safety by equipping the aircraft that fly the most hours in the Southeast Alaska Region (which will be VFR aircraft).

3. Provide a transition to the more stringent aircraft and operational certifications by installing Part 23 aircraft that are used in Part 135 operations first, and Part 25 aircraft used in Part 121 operations, after most or all Part 23/135 aircraft are installed.

4. Provide a transition to the more complex installations by performing some VFR installations before doing all the IFR installations (e.g., one on each major model of VFR aircraft), with the remaining initial IFR installations immediately thereafter.

5. After accounting for the above factors, provide installations of aircraft that are equal on the above priority bases on a first-come, first-served basis, based on the dates of execution of the agreement between the operator and the FAA.

Operators will be asked to provide the hours of VFR and IFR time in Southeast in the last 12 months, and expected differences (e.g., additional IFR hours) in the next 12 months.

D. Safe Installations

Increased safety is the reason for the Capstone program, so all installations will place safety above all other considerations. Safety will be assured by including in the avionics installation contract provisions for FAA involvement in the prototype installations, oversight of the training of avionics technicians, and the inspection of the installations. Any operator concerns about the inspection may be brought to the FAA, if not resolved satisfactorily by the installation contractor.

E. Efficient, Expeditious, Convenient Installations, Correlated with Routine Maintenance, and with Minimum Additional Downtime

Only one operator (LAB) has a phased inspection program, where even the Phase 4 maintenance only takes about a week. The other operators have annual inspection downtimes ranging from 2 to 4 weeks. It appears that for most operators the avionics installation could be done concurrently with the annual inspection, and would not interfere with the inspection because little of the annual maintenance involves the cockpit or avionics. It appears that the concurrent Capstone installation could be accomplished with no additional downtime in many cases, or with just a few days additional downtime. One major advantage of this method is that multiple installations could be accomplished at the same time by leveraging the hangar space and maintenance employees of the operators.

Even if this concurrent installation method is impractical, most operators expressed a desire to have the installation done in their own hangar. Some also want the installation done at least in part by their personnel, as subcontractors to the prime contractor.

It is recommended that the prime contractor confer with each operator about its avionics installation capability and desired level of participation.

In addition, the prime contractor will need to provide hangar space in addition to the operators' facilities where there is insufficient room in the operator's hangar. Based on conversations with Aero Services in Juneau, they have up to three hangars that could be made available (depending on the lease term and price) for this purpose. These hangars are generally approximately 60 feet wide by 40 feet deep, which provides sufficient room for conducting at least two airplane installations at a time.

II. Detailed Procedures: Manner and Timing of Installations, Optimum Sequence of Installations, Partial Installations

A. General Recommendations

The installations should be accomplished by a prime avionics installation contractor, who will subcontract to other avionics installers based in Anchorage and Juneau, and to some of the operators. In general installations should occur in the hangars of the operators during major inspections and maintenance. Some installations will occur in hangar space leased by the installation contractor.

Because of delays in avionics delivery and the predominance of usage of the aircraft during the summer tour season, from May 1 to October 1, very few installations will occur during the summer, and few will be accomplished during the Winter 2002 / Spring 2003 season.

It is recommended that approximately 24 aircraft be installed in the Winter 2002 / Spring 2003 period, and the remaining approximately 150 be installed during the Winter 2003 / Spring 2004 season.

The optimum sequence for the aircraft to be installed in the Winter 2002/Spring 2003 period is:

1. Begin with at least one IFR airplane that is able to immediately conduct IFR operations (under its operational specifications).

2. Install some VFR airplanes to gain experience in less complex situations and attempt to get at least one of each type of airplane installed.

3. Install the other IFR airplanes to get at least a few completed for the summer 2003 season, giving preference for those that can be immediately operated IFR.

Continue with this sequence in the Winter 2003/Spring 2004 period. As discussed in the priority section above, IFR airplanes should receive a preference over VFR airplanes, and those flown more hours in Southeast Alaska should get preference over those flown fewer hours there. Part 25 / Part 121 aircraft should be done after most or all Part 23 / Part 135 airplanes are installed.

Partial installations involving two down-time periods for operators and additional cost to FAA will be avoided by not beginning installations until the all display units (except the UAT control heads), trays, cables, plugs, wiring harnesses, terminal blocks, antennas, etc. have been delivered to the installers. However, all of the Spring 2003 installations will be "partial" in the sense that they will not have an ADS-B UAT unit or control head (other than for installation testing purposes) until the UAT units are delivered later in 2003. However, if the trays and cables are pre-installed, the installation of the actual radio units when they arrive should be accomplished in the evening with no aircraft down time, needing only to connect the units to the trays and cables and perform final integration testing.

B. Recommended Installations for Winter 2002/Spring 2003

Operator	Aircraft: VFR/IFR	Installation Location
Alaska Seaplane Service	1 Beaver: VFR	Juneau ASS Hangar
Coastal Helicopter	1 AS 350: VFR	Juneau Coastal Hangar
Harris	1 Chieftan: IFR 1 Beaver: VFR	Sitka Harris Hangar
LAB Flying Service	3 Chieftains: IFR 2 Islanders: IFR 1 Seneca: IFR 1 Cherokee: VFR	Juneau LAB Hangar and Avionics Contractor Hangar
Northstar Trekking	1 AS 350: VFR	Juneau Northstar Hangar
Pacific Airways	1 Beaver: VFR	Ketchikan Pacific Airways Hangar
Promech	2 Twin Otters: IFR 1 Beaver: VFR	Ketchikan Promech Hangar
Skagway Air	2 Cherokees: VFR	Skagway Skagway Air Hangar
Taquin	1 Beaver: VFR	Ketchikan Taquin Hangar
Temsco	2 AS 350s: VFR	Juneau Temsco Hangar
Wings of Alaska	2 Caravans: IFR 1 Beaver: VFR	Juneau WOA and Contractor Hangars

Summary Of Winter 2002/Spring 2003 Installations

- Operators Involved: 11
- Total Aircraft to Be Installed: 24
- IFR-Capable Aircraft: 11
- Different Types of Aircraft: 8
  - 6 Beavers
  - 4 Chieftains
  - 4 AS 350s
  - 3 Cherokees
  - 2 Twin Otters
  - 2 Caravans
  - 2 Islanders
  - 1 Seneca
- Installation Locations: 12 hangars in 4 cities.

C. Estimated Cost of Initial Installations

The following estimate is based on the experience of the first Capstone Phase II installation by Northern Lights Avionics on a Cessna 172-RG owned by the University of Alaska. This could be considered a "Part 91 IFR installation", because it had dual IDUs, AHRS, and ADCs, but only one GPS. It included no ADS-B equipment. This first installation required about 500 man-hours, however a substantial amount of time was expended because of lack of parts and installation data that should not occur in the production installations (which are described below).

Assumptions for cost estimate for Winter 2002/Spring 2003 installations:

1. The installers will have on hand before they begin the installation everything they need to complete the installation, i.e.: all radio components (except the UAT control heads and UAT radios – but all trays and cables for the UAT will be on hand), all trays, cables, RFI shielded plugs, factory-made wiring harnesses with numbered wires, diodes, terminal blocks, and antennas, etc. The installers will also have all wiring diagrams, drawings, and other installation data on hand, and will have some Chelton factory support on the scene at least for the initial installations.

2. Pre-cut instrument panels are available when the installers are ready for them, and will be of typical commercial aircraft quality (not the showcase quality of the first installation).

3. Virtually all of these initial installations will be "prototypes" (which are estimated to take about 50% more time than a "production" installation), because the only type airplane where subsequent installations will be nearly identical to ones done previously are the Beavers. Even though there are four Chieftains, these are usually different enough that none may be the same until you get to the fourth one.

4. All of the operators choose a two-display installation on the main instrument panel. (Note: If only one display is installed in the radio stack, there would be a substantial saving in man-hours (in the range of the 120 or 140 hours). Operator preferences expressed in the April meetings indicate that most if not all installations will have two-displays.

5. All of the VFR aircraft in this initial installation will only receive one AHRS, one ADC and one GPS. The IFR aircraft will receive two AHRSs, two ADCs and two GPSs. All aircraft will receive one UAT unit, and one cockpit UAT control head.

6. Operators of VFR aircraft will retain airspeed indicators and altimeters. Operators of IFR aircraft will retain at least airspeed indicators, altimeters, and attitude indicators, and those with autopilots will retain their turn-coordinators, HSIs or DGs as necessary for autopilot control. If a Navigation Interface unit were available and included in the program, this would involve a similar amount of time to interface into all affected systems. IFR aircraft also will have backup power supplies (an additional battery) installed.

7. Installers will have a typical hangar cost (built into the $70 per hour labor rate). Workbenches and miscellaneous tools and parts will be available as in the shop of a typical avionics installer.

8. A simplified system checkout system will be devised for the AHRS and ADCs, including the process for making the required certifications on electrical loads and RFI.

Initial Installation Cost Estimate: Winter 2002/Spring 2003

Aircraft Number, Type, VFR/IFR	**Labor Time (Installation Type, Man-Hours) Each/Total**	**Incidental Parts Cost Each/Total**
1 Beaver: VFR	Prototype: 300	$2.5K
5 Beavers: VFR	Production: 200 x 5 = 1000	$2.5K x 5 = $12.5K
1 AS 350: VFR	Prototype: 300	$2.5K
3 AS 350s: VFR	Production: 200 x 3 = 600	$2.5 x 3 = 7.5K
1 Chieftain: IFR	Prototype: 350 :	$2.5K
3 Chieftains: IFR	Semi-Prototype 300 x 3 = 900	$2.5K x 3 = 7.5K
1 Cherokee: VFR	Prototype: 300	$2.5K
2 Cherokees: VFR	Production: 200 x 2 = 400	$2.5K x 2 = 5K
2 Islanders: IFR	Prototype: 300 x 2 = 600	$2.5K x 2 = 5K
1 Seneca: IFR	Prototype: 300	$2.5
2 Twin Otters: IFR	Prototype: 350 x 2 = 700	$2.5K x 2 = 5K
2 Caravans: IFR	Prototype: 350 x 2 = 700	$2.5 x 2 = 5K
TOTALS **24 Aircraft, $511,000***	6450 Man-Hours @ $70 per hour $451,000	$60,000

*Does not include the expense of transporting to and housing personnel to Southeast Alaska.
* Assumes $70 per hour labor rate.

Compared to the estimates in Report D-1, these figures are in line with, although somewhat higher than, the estimates for twin-engine airplanes, but they exceed the estimates for single-engine aircraft. However, these initial installations represent mostly prototype installations, and even the production installations are estimated to cost more than the expected long-term average. This is because in order to complete 24 installations in 10 weeks, there will need to be about six, two-man work teams, and these installations will be the first or second installation for each work team on a given type of airplane.

D. Estimated Installer Workforce Required

At 10 hours per day for a two-man crew, 6450 hours will require 322 crew-days. Assuming 6-day weeks, this will require 53.75 crew-weeks. Assuming these installations are accomplished over a 10 week period, they will require 5.4 two-man crews working simultaneously. Therefore, the installation contractor will need a workforce of 11 men at 5 or 6 locations to do this work.

E. Spares Number and Locations

Spare units should be located wherever either one IFR airplane is based or several VFR airplanes are based if there are mechanics capable of trouble shooting and performing unit replacement and setup at those locations. The following locations and numbers of spares of each unit (IDU, CCU, AHRS, GPS, ADC, UAT) are recommended for 2003 and 2004. It is recommended that all 2003 spares be in place when installations begin in 2003.

Location	Probable Capstone Aircraft Summer 2003/Summer 2004	Spares Recommended 2003/2004
Juneau	14 / 90 TBD	6 / 10
Ketchikan	6 / 30 TBD	2 / 4
Sitka	2 / 2 TBD	1 / 2
Skagway	2/ 9 TBD	1 / 2
Other	0 / 20 TBD	0 / 2
Total All Locations	24 / 152	10 / 20

Note 1: The 2004 numbers are TBD pending the Fax-Back form data collection process.

Note 2: Some operators send their aircraft outside the Southeast Alaska region in the winter. Unless they have spares at the winter location, they may not equip with the PFD for fear of AOG problems.

III. Installation Timing Relative to Avionics Deliveries

There will be fewer installations in the Winter 2002 / Spring 2003 time period than estimated in the Report C-1 because of the following factors:

- The desire to have airplanes in the shop only one time for the Capstone installation.
- The delay in receiving avionics sufficient for a complete installation until February 2003.
- The closing of the installation time “window” on April 15 for almost all operators.
- The initial installation for any type of aircraft, and probably the probably the first installation for each crew of technicians, will take approximately 50 percent more time than subsequent, “production”, installations.

- There will be seven types of aircraft in the initial installations, and five technician crews, and therefore most of the installations will take longer than production installations.

The limited initial time window of 10 weeks, and the fact that almost all installations will be either prototype installations or first time installations for the technician teams, means that it will take a maximum effort to install the proposed 24 aircraft before the 2003 summer season. The specific order of installations should be determined based on collecting information from operators on the Capstone Participant Information Form (see Appendix C).

However, the experience gained in these initial installations, and the operational and maintenance experience gained over the 2003 summer season, should enable the Winter 2003/Spring 2004 installations to go smoothly, and for the remaining approximately 150 installations to be accomplished over the 28 week period from October 1, 2003 to April 15, 2004. This assumes that there will be a substantial carryover of trained crews from the Winter 2002/Spring 2003 installations, and the training videos or materials based on the initial installations will be available for the second year installations. There will likely be 5 or 6 locations for concurrent the installations during this period, which would require an installation rate of one installation at each location per week to complete all remaining installations before the summer 2004 season. This installation rate would require about two technician crews per location simultaneously. This would amount to about 22 technicians.

IV. Avionics Transportation and Secure Storage, and Spares

Avionics should be shipped to the avionics installation contractor, to a location that it specifies. The contractor should have sufficient inventory space to accommodate the shipments as provided in the contract with the avionics vendors.

The installation contractor should be responsible for the secure storage of these units in its inventory until installed, and should have an accounting system acceptable to FAA for tracking all units received, including the ability to track avionics to a specific aircraft once it is installed, and including any changes of equipment due to replacement of defective units.

Spares storage and accounting should be the responsibility of the avionics installation contractor until the termination of that contract, although it may subcontract this task to operators. Upon the termination of the installation contract, spares storage and accounting should be handled by the operators under contract to FAA. The number and location of spares is described above in Section II B.

V. Reimbursement Process

The avionics installation contractor should be reimbursed pursuant to the terms of its contract with FAA. Because of the need to move employees of the installation contractor to the Southeast Alaska area, this process will have to be negotiated by FAA and the contractor. Unlike Capstone I, we do not have good cost information because of the complexity and potential variability of the installations and the need to perform installations at different locations with different amounts of operator assistance in each case.

VI. Configuration Management Process

The installation contractor should be responsible for creating and implementing the configuration control process until the completion of the installation contract in the summer of 2004. At that time, FAA should either extend this contract or find another contractor willing to continue implementation of this system until the completion of the program in 2009.

Capstone Phase II Avionics Installation Program
Report E-1: Appendix A
Additional Questions

October 14, 2002

1. Can the operator download to each of the aircraft avionics a set of standard routes and waypoints? Does it have the capacity for 20 routes comprising 500 waypoints? How would this physically be accomplished?

2. How long will FAA pay for the GPS data base upgrades, and how much will these cost the operator, per airplane, once the operators are responsible for this cost?

3. Will there be additional equipment for testing IFR aircraft at Juneau (e.g., encoder testers)?

4. How does the data logging feature work, and how does the operator view the flight data for pilot counseling?

5. Can the vacuum pumps be removed if the operator elects to have all vacuum instruments removed (e.g., on the typical VFR two-screen installation)? Will this require an STC and if so, how will this be done? What will the cost be to the operator to remove the vacuum pumps?

6. Can the avionics installation contractor subcontract to the operator for installation assistance, or to perform the entire installation?

7. Can the altitude band for the CDTI be selected by the operator to avoid clutter and extraneous warnings when flying in flights or in the immediate Juneau area? At least can there be more than one standard altitude band (such as a “normal” mode of +- 2002 ft and a “de-clutter” mode of +-500 ft) that the pilot can select?

8. Will there be longer Special VFR delays when there are increased IFR operations at Juneau?

9. Will the software that operators will be given to view their aircraft’s position enable them to pick out a specific aircraft to be tracked?

10. On a two-screen installation VFR installation, if the PFD screen fails, and the PFD display goes onto the ND screen, can the operator toggle between them, or will the remaining screen always be in the PFD mode?

11. How will maintenance and spares be handled on aircraft that are taken out of the Juneau area during the winter (e.g., for heli-skiing in Cordova, or taken out of Alaska completely)?

12. When will a training simulator be available?

13. Can FAA have a helicopter with the rotorcraft version of the avionics available for demonstration flights at the HAI’s HeliExpo show in February 2003?

14. Are the electronics in the Integrated Display Units “potted” for shock resistance?

15. Does the 5-year depreciation period start when the actual installation occurs in a specific aircraft?

16. Where will the spares be located, and can at least one set be located at Sitka and Skagway?

17. What is the weight of the removed avionics?

18. Will the installation need a remote flux gate magnetometer?

19. How does the PFD depict navigational information from ground-based sources, such as ILS glideslope indications?

20. Is the data base worldwide, or just US?

21. How will the system integrate with existing autopilots? In airplanes with existing air data computers, electric compasses, etc. driving their flight management systems, can these be removed or interfaced with the Chelton system?

22. Can weather radar data be displayed on the MFD? If so, from what radar models?]

23. Will FAA spend the money to integrate the avionics with a Part 25 FMS (UNS1) and its air data computers, and retain the autopilot and flight director functions? Or would the Lear be a ND/MFD, GPS, and UAT install (no PFD)?

24. What could be done and when to downlink weather information from Capstone II aircraft: either icing (from IFR capstone a/c), or G forces and inferred wind speed and direction from the IDUs, to supplement the JNU wind hazard system inputs?

25. Would FAA provide dual AHRS and ADCs for VFR aircraft?.

26. What can be done to avoid false TAWS warnings in the helicopter glacier tour profiles? Are gross terrain data inaccuracies to be expected on the glaciers and multiple peaks because of “terrain” movement and survey inaccuracies?

27. What is likely to happen regarding satellite tracking for search and rescue for flights off waterways and not in line-of-sight. USFS wants this, and in the Temsco helicopter crashes, the ELT was not triggered because of the low-G crash, and other copters crashed looking for earlier crashes since they were not “marked.”

28. Can the system be pre-programmed for an escape maneuver (with the boxes showing a level altitude turn away from the terrain?

29. In a two IDU VFR installation, can the operator take out the vacuum pump, since there are not vacuum instruments (to save weight)?

30. What are the equipment failure statistics for Capstone I equipment?

Capstone Phase II Avionics Installation Program
Report E-1: Appendix B, Operator Decisions

September 21, 2002

Operator Key Contact	Loc	% Sum	Whl VFR	Whl IFR	Float VFR	Float IFR	Heli VFR	Acft In Prog Yr1/2
LAB Flying Service. Lynn Bennett	J	66	22	3	1	0	0	7/all
Wings of Alaska. Bob Jacobsen	J	70	14	2	11	0	0	3/all
Skagway Air Service. Mike O'Daniel	J	70	9	2	0	0	0	2/all
Ward Air. Ed Kiesel	J	60	3	0	4	0	0	0/?
Air Excursions. Mike Loverink	J	50	5	0	1	0	0	0/?
Coastal Helicopters. Jim Wilson	J	70	0	0	0	0	6	1/all
Tal Air. Jacques Norvel	J		1	0	0	0	0	0
NorthStar Trekking Bob Englebrecht	J	80	0	0	0	0	3	1/all
Alaska Seaplanes. Craig Loken	J	80	0	0	3	0	0	1/all
ERA Helo. Bill Clutton. Lash Larew	J	99	0	0	0	0	14	0/?
Executive Flight; Magnusen	J	70	0	1	0	0	0	0/1
Silver Bay logging. Errol Champion	J	90	0	0	0	0	0	0
			0	0	0	0	0	
			0	0	0	0	0	
Temsco Hel. Joe Hicks	K	90	0	0	0	0	33	2/all
Promech. Tony Dupea, Mark Easterly	K	70	0	0	10	2	0	3/?
Taquin Air: Brian Salazar	K	70	0	0	6	0	0	1/?
Pacific Airways. Mike Rhodes	K	80	0	0	5	0	0	1/?
Island Wings. Michele Masden	K	80	0	0	1	0	0	0/1
Carlin Air. Jeff Carlin	K	80	0	0	1	0	0	?
Harris Acft. Svc. Scott Harris	S	75	0	0	2	0	0	2/all
Air Sitka. Ken Bellows	S	75	0	0	1	0	0	0/1
Lynden Air Cargo. Jerry Vink	A		0	1	0	0	0	0/1
Alaska Airlines			0	0	0	0	0	?
Pacific Wings	P	75	0	0	3	0	0	
Nordic Air	P		0	0	1	0	0	
Kupreanor Air	P		0	0	1	0	0	
Sunrise Aviation	W		1	0	1	0	0	0/2
ACE	A	50	0	4	0	0	0	4
			0	0	0	0	0	
			0	0	0	0	0	
			0	0	0	0	0	
Total			52	9	52	2	56	24/?

Report E-1 Appendix C
Capstone Participant Information Form
(Form Version 1.2)

I. Operator Information

Operator Name: _____; Date: _____

Operator Address: _____; Phone: _____

Main Base Location: _____; Other Bases: _____

Person Completing Form: Name: _____; Position: _____

II. Participating Aircraft Information

For each aircraft you would like to participate in the Capstone II program, please provide the following information:

- Aircraft type (e.g., Piper PA-31-350 Chieftain).
- Aircraft N-number.
- Number of VFR hours flown in Southeast Alaska in the last 12 months.
- Number of IFR hours flown in Southeast Alaska in the last 12 months.
- Estimated number of IFR hours that will be flown in Southeast Alaska in the 12 months following the Capstone avionics installation (assuming that the low-altitude IFR infrastructure is in the Southeast Alaska area is implemented as described by FAA).
- Whether it is owned by you ("O") or is leased by you ("L)

Aircraft Type	N-Number	Southeast VFR Hours, Last 12 Months	Southeast IFR Hours, Last 12 Months	Southeast IFR Hours, Est. in 12 Mos after Installation	Owned or Leased

If additional space is needed, please copy this page and insert information on additional aircraft.

Installation Location and Timing

For each aircraft listed in the table above, please provide the following information:

- N-Number
- Desired Type of Capstone Installation: VFR 1, VFR 2, IFR, or UAT.
    - VFR one navigation/multifunction display (ND/MFD) = "VFR 1"
    - VFR two-display with primary flight display (PFD) and ND/MFD = "VFR 2"
    - IFR one-display with ND/MFD only = "IFR 1
    - IFR two-display with PFD and ND/MFD = "IFR 2"
    - ADS-B/UAT transmitter only = "UAT"
- Desired Location of Capstone Installation, either:
    - The operator's (i.e., your) hangar = "Oper", and city.
    - Avionics Installer's hanger = "Inst", and city.
- Desired Installation Time Period, either:
    - Spring 2003: from February 1 to April 15, 2003 = "Sp 03", or
    - Winter 2003 – 04: from October 1, 2003 to April 15, 2004 = "Wn 03-04"
- If you selected Sp 03, provide the preferred start date, and normal maintenance down time in work-days for the aircraft. Note: the expected installation duration for VFR installations is about 2 weeks for the "prototype – first of a kind", and about 7 work days thereafter; for IFR installations, it is about 4 weeks for the prototype and about 14 work days thereafter. Start dates for SP 03 installations are between Feb 1 and Apr 1.

N-Number	Desired Type of Capstone Installation	Desired Location of Capstone Installation	Desired Installation Time Period	Desired Start Date (mo-day)/ Down Time (work days)
				/
				/
				/
				/
				/
				/
				/
				/
				/
				/

III. Maintenance Staff Involvement

Please check on the desired level of your maintenance staff's involvement in the installation:

___: Only train one maintenance person for troubleshooting and unit replacement.
___: Avionics installation contractor personnel to perform most work, with some assistance by operator's maintenance staff.
___: Operator maintenance personnel to perform most work as a subcontractor to avionics installation contractor, and under its supervision and procedures.

IV. Installation Dates

Note: FAA will determine installation dates primarily based upon: the number of VFR and IFR hours flown in Southeast Alaska by the aircraft; operator desired installation dates; and the date when the Operator Agreement is entered into with FAA.

Report E-1 Appendix D
Capstone II Southeast Alaska Operator Benefits
August 7, 2002

I. VFR aircraft: Safety Enhancements

A. Benefits When You Install Capstone II Avionics In Your Aircraft

- Avoid controlled flight into terrain (CFIT) and loss of control accidents:
  - Primary Flight Display (PFD) – pitch/roll airspeed and altitude, with: dynamic stall speed and stall warning, AGL read out, velocity vector, skyway approach guidance, ground track and bearing to waypoint display, etc.
  - Navigation Display (ND) / Multi-Function Display (MFD) -- GPS color moving map navigation, shore lines, terrain warning, approach and missed approach path, glide distance.
- Avoid mid-air collisions: See-and-Avoid enhancement between your equipped aircraft, with graphical aircraft position displayed on both PFD and ND.
- Avoid pilot errors of judgment by enabling supervisors to monitor flight data through the data logging function, and then counsel pilots afterward.

B. Additional Benefits When Others Install Capstone II Avionics In Their Aircraft

- See-and-Avoid enhancement between your equipped aircraft and equipped aircraft of other operators, with graphical position displayed on both PFD and ND.

C. Additional Benefits When FAA Provides Ground Systems – Phased In

- Flight follower and operations supervisor use of position and altitude information displayed on office computer for flight tracking and operations conformance monitoring.
- Juneau VFR tower and AFSS display of aircraft for "radar-like" terminal and tower sequencing and VFR flight plan monitoring services, and for runway incursion avoidance.
- Weather data link to aircraft for display on MFD -- METARs and TAFs, text and graphics, Icing and other PIREPs, and possibly icing and C&V graphics, and AWOS data.
- Enhanced Search and Rescue in main waterways in the Juneau, Gustavus, Haines, and later the Ketchikan areas; radar-like coverage down to 500 ft AGL and display at FSS and operator to back-up ELT.
- See and avoid enhancement from position displays of transponder-equipped airplanes (to see Alaska Airlines jets, and outsiders usually not familiar with local procedures).

II. IFR aircraft: Useable IFR Infrastructure and Simplified Approach Guidance

A. Benefits When You Install Capstone II Avionics In Your Aircraft

- Simplified approachs with PFD/ND velocity vector and skyways guidance.

B. Additional Benefits When FAA Provides a useful IFR infrastructure

- En Route. GPS Minimum En Route Altitudes (MEAs) where terrain now results in high MEAs. E.g., Juneau – Hoonah – Gustavus, target GPS MEA of 2500 feet.
- Non-Precision Approaches, arrivals and departures, at airports currently with no approach, or only high-minimums approaches; in the Juneau area initially, then at Ketchikan, Sitka and other Southeast airports. Target MDAs: Gustavus 550 ft MDA; Hoonah 500 – 800 ft. MDA.
- Terminal and En Route radar-like services, at Juneau and Anchorage Center.
- Additional remote voice communications outlets, in Stephens Passage.

Report E-1 Appendix E

Capstone Phase II Avionics Systems Description

10 Components (3 on panel, 4 remotes, 3 antennas, cables)	**Size**	**Weight**	**Power Draw**	**Connections**
Primary Flight Display (PFD). Chelton/Sierra Flight Systems, Integrated Display Unit (IDU), 6.5" diagonal, full color, high resolution, sunlight readable, hardened for vibration, adjustable brightness (640 x 480). 700 MHz, PIII, 64M RAM, 512 MB HD, Flash memory, smart media for software, navigation data and terrain updates (normally not in unit).Updates every 56 days.	6.25" wide (6.3 bezel) 5.5" high 3.25" deep 4" to back of tray, 6" with connector and maintenance room	4.5 lbs.	12 – 34 VDC 4.5 a 12V	ARINC 600 connector (150 pins). Power, ground, 3 wires each to AHRS, GPS, ADC, the other IDU.
Navigation Display (ND), and backup PFD. Same as above. For IFR aircraft only. For VFR airplanes, the PFD toggles to ND.	Same	Same	Same	Same
Cockpit Control Unit (CCU) for ADS-B unit. (Pending Selection) Selections: Receive, Auto, anonymous modes (random ICAO address, except when in emergency mode), Flight ID (up to 8 characters, N number or flight number), status.	6.25 " wide 4" high 5" deep Panel mount	1.5 lbs.	11-35 VDC 2 a @ 12 V	Panel mount tray. ARINC 429 or RS-232 channels.
12 channel WAAS GPS receiver. Free Flight. GPS: TSO C146. Remote Mount.	3" wide 4" high 4" deep	2 lbs with antenna	12- 34 VDC 350 ma	Connection to antenna, power, and EFIS
ADS-B Unit. (Pending Selection) GPS: TSO C145 b2 Data Radio: UAT, 978 MHz, 125 watts transmit (200 nm range), TSO'd to new UAT MOPS. Output to both IDUs	6.25" wide 4" high 10" deep Flat or side mounting.	5.5 lbs.	11-35 VDC. Xmit every second. 8 a @12V	
Attitude heading reference system (AHRS). Crossbow AHRS500GA. Strap-down inertial system, fully sealed. Stabilized by long-term gravity and magnetic north references.	5" wide 5" high 5" deep Remote	2.5 lbs.	12 – 34 VDC 350 ma @12V	Connection D/Sub 15 (15 pins) comm. Line to EFIS, other line to battery pos and neg. RS 422 serial.
Air Data Computer (ADC). Shadin DC-200 Fuel/Airdata Computer.	4" wide 4" high 6" deep Remote	1.5 lbs.	12 – 34 VDC 350 ma @12V	D/Sub 25, 3 wires to AHRS, others to power and ground, pitot and static port.
Antennas: GPS antenna (splitter), 2 UAT antennas (up/down)		5 lbs.		
Cable to connect, PFD, ND, GPS, AHRS, ADC, power, ground.		5 lbs.		
Cable to connect ADS-B to CCU, twisted pair, both ways to IDU		3 lbs.		ARINC 429, RS 232
Total: Two displays, one of each remote unit		35 lbs	20a @12V	

Report E-1 Appendix F

Capstone Avionics Configurations

August 7, 2002

Configuration	IDU1 PFD	IDU2 ND	CCU UAT	ADS UAT	GPS	AHRS	ADC	GPS Ant	ADS Ant	Cables	Wt. Lbs.	Pwr 28v	Comments
ADS-B UAT transmit only			1	1				1	2	1	15	5	Flight follow, cooperative see/avoid, ATC sequence
VFR: ND display only (in radio stack)		1	1	1	1		1	1	2	2	28	8	ND only, in radio stack. Ground track only (not course).
VFR: PFD and ND displays (both in panel, or one in panel, one in radio stack)	1	1	1	1	1	1	1	1	2	2	35	10	Full time PFD in primary field of view
IFR: PFD and ND displays (both in panel)	1	1	1	1	2	2 1*	2	1	2	2	41	11	Dual redundant systems. Note: electrical system requirements. * If retain attitude indicator.

* If retain flight instruments. Note: The weights of typical flight instruments are as follows:
Airspeed: 3.5 pounds; Altimeter: 3.5; DG: 3.1; ADI: 2.5; VSI: 1.5; Turn/Bank: 1.2; TOTAL: 15.3 pounds.

Updated Operator Summaries
Report E-1: Appendix G
October 14, 2002

Operator	Aircraft & Pilots	Operations
Air Excursions **Juneau** Mike Loverink, owner Larry Haven, Ch. Pilot Joe Pagenkopf, pilot 789-5591 15 years no accidents. TAWS and PFD important, but G-195 better than ND. Like glide area, Insufficient shore line contrast.	**6 aircraft: 0 IFR (leased)** 3 Cherokee 6s 1 C- 206 amphibs 1 Saratoga 1 C-172 **4 full-time pilots** 2 in Gustavus 2 in JNU 34-47, 3.5 – 10K	DNVFR (but very few night, must be clear to get glide distance). Charter only. Gustavus, Hoonah, Excursion Inlet, Haines, Yakutat, Sitka, Kake, Petersberg, Pelican, Elfin. $325/hr. 50% summer. 100% over water, 500 ft, ¾ nm from shore. 70% of time in radio contact – proposed coverage zone. Looking into IFR use and purchasing IFR aircraft.
Air Sitka **Sitka** Kenneth Bellows 747-7920 747-3012	**1 Airplane: DFVR** C-185 floats **1 pilot** 30 years, 35K hrs.	Charter, 6 locations, w/I 100 nm, all year. Terrain warning. 30# OK.
Alaska Airlines Mike Adams 206 433 6872 206 953 0622 (cell)	B-737 200, 400, 700	All IFR; JNU, GST, KET, other Southeast locations. Benefits: Sees no operational advantage. Wants either lower landing minimums or radar-like services to increase IFR operational rate. Concerns: Cost of increase empty weight; down time for installation, maintenance training, pilot training, non-standard fleet, spares.
Alaska Central Express **Anchorage (Little ACE)** Mike Murphy, Dir. Operations 334-5114, 223-0485 Four C-207s in BET are Capstone I equipped Accidents: 1 gear up 1 CFIT short landing St Marys 1 CFIT C2207 Tuksuk 1 CFIT Brazilia BET short back course ILS	**4 Airplanes: IFR** 4 BE 1900s' (downsized from 6 in August) **29 pilots** Was 49. Level flight hours over year	All 4 airplanes have routes in Southeast AK JNU, KET, Wrangell, Petersburg, Sitka. 2 airplanes per day in Southeast Mon – Sat 13 hours/day Wants IFR infrastructure. One airplane getting EGPWS. Would want to install GPS and UAT only on it.

Operator	Aircraft & Pilots	Operations
Alaska Seaplanes Service **Juneau** Craig Loken, owner 789-7880 akseaplanes.com Bill Kalbrener, Chief Pilot Cable Wells, Dispatcher. Barker avionics. 12/94 accident, 206 amphib, white out, hit shore, lost leg, likely prevented with shore-line GPS. 7/96 accident, Beaver, Hoonah Elfin Cove, Fatal tried fro 900 ft pass, impact at 1300 ft nearby. Shore-line GPS could address. BUT, he does not use GPS maps for fear of unreliability, higher workload, head in cockpit, and other misuse Flight following most important. Needs MEL. Will keep old instruments. One IDU for VFR. Inadequate shore contrast.	**3 Aircraft: 0 IFR** 3 Beavers on floats. **5 Pilots** 5 Pilots this summer 2 year round on 1 beaver, 8K-17K. 44-55, 3.5K – 17K 3 part time summer, same age and experience. Younger guys are more comfortable with computers and GPS.	DVFR. 5% Part 91 reposition. 65 – 70% summer tour ships and other tourists. OAS certified airline. AACA board 3 years, been to Capstone meetings. Don't go downtown Juneau. Scheduled to Angoon, Pelican, Wants weather cams ($500 in communities, want them in critical areas, passes), shorelines. Low altitude is 500 and 2. Not safe to be in clouds in single-engine beaver, not an IFR airplane. Can't use IFR routes because of fiords. At 2000 ft over water, engine quit, how land? If enough altitude beneath clouds to land, why not fly there? 2 accidents in 13 year, neither one if had good shoreline GPS. Garmin-295. Stick to 500 and 2. If have one may get in deeper. 1950s airplanes not 135 SE IFR airplane, no ice boots, multiple vacuum. GPS useful for picking best winds. Most important feature is shore line.
Carlin Air **Ketchikan** Jeff Carlin 225-3036	**1 Airplane** DHC – 2 Beaver **1 Pilot** Pilot 46, 14K hrs.	Charter only, year round, but winter (Oct to May) is slow.
Coastal Helicopters **Juneau** James (Jim) Wilson, President, and Dir. Ops. 789-5600 jwcoastal@gci.net	**6 Aircraft** 1AS 350 BA 2 AS 350 B1 1 AS 350 B2 2 Bell 206 All DVFR, no IFR plans (Plus 2 leased) **11 Pilots (**this summer) 5 full-time 1-2 new pilots. 4 mechanics,	65-70% Industrial charter, construction, mountain radio repeater, mineral exploration, power line service. 20 – 25% Tour. 5-10% heli ski. 50 – 60% in voice contact. 65-70% summer. Concern pilots will push too far. Wants to get simulator and lease it to others.

Operator	Aircraft & Pilots	Operations
ERA Helicopters **Juneau** Lash Larew Sue Windlebeem Leann MacDonald, JNU Base Manager Does own avionics work, ANC. Not remove instruments. Need MEL. Pilot adjustable V speeds, delete stall warning over velocity vector. Identify aircraft number on display.	**14 in JNU area** all AS 350 B2s all transponder equipped 10 in Douglas, 4 at JNU **17 pilots** Seasonal, 2K low, 5 – 7K typical.	DVFR 95% tourist: "scheduled" fixed route. 5% contract, cargo. 75% over ground, always close to ground, 300 ft over ridges, 500 and 2 by LOA, Clear of clouds. 100% summer,
Executive Flight **Juneau** Eric Magnusen, Owner 790-2982 800 762 8253 723-6453 cell emagnum@aol.com	**3 Airplanes, 3 IFR** Lear 35s, FAR 25 1 based in JNU, 2 in SEA **6 Pilots** Age 20 – 45, 3.5 – 10K hrs	All Medevac, IFR, JNU to SEA, mostly tour boat visitors. 1-2/wk winter, 6-9/wk summer. Mid-air avoidance with tour companies.
Frontier **Sitka**	Navajo, IFR, MedEvac	RFPs out to replace them with hospital. Want King Air to replace it. Harris will submit proposal.
Harris Aircraft Service, Inc. **Sitka** Robert "Scott" Harris Mark Hacket, Director of Ops. 966-3050. 752-0220 cell flyhackett@hotmail.com. scott@harrisaircraft.com	**2 Airplanes** 1 – DHC – 2, Floats 1 -- C 185 amphibian floats. 2 year round pilots: 36, 46, 10K+ 1 seasonal, 40, 8K. Air ambulance in Beaver. Thinking of getting a light twin. So may be a couple of twins in Sitka this fall. CII great. Little traffic.	135 on-demand (200 nm Ketchikan or Yakutat, occasionally, Juneau, Petersburg Wrangell, 100 nm. Most 60 nm, 30 – 45 mins each way. Scheduled, 3 days a week. Sitka – Kake (45 east) -- Angoon – Port Alexander FL 6 – 9 summer. IFR in fog to depart. Summer, 60% of business, so if can improve this, good. Three air taxis in Sitka.

Operator	Aircraft & Pilots	Operations
Island Wings Air Service Ketchikan Michele Masden 225-2444 254-0851 cell	**1 Airplane** 1- C 185 **1 Pilot** Pilot 41, 8K hrs	Charter only.
LAB Flying Service Juneau <u>Lynn Bennett, owner</u> <u>Chuck Johnson, Ch Pilot</u> <u>Jason Hart, Dir Maint.</u> Laura Epalt, Dispatch 789-9160 723-2058 cell Lynn Accidents – all in charters because pilots have latitude in conducting flight. None in commuter because all procedures specified and trained to follow. 2002 Glacier bay 1997 Young's Pass IMC 1996 Davidson Glacier white out 1990 Wind Mountain none for previous 20 years Backup Instruments: Will retain all existing.	**26 aircraft: 3 IFR** **Op Spec IFR Authorized** 15 cherokee sixes 1 senca (IFR) 2 Britten-Norman Islanders (no deice) 3 chieftans (2 IFR) 601P aerostar 1 helio currier 1 Lake 250 renegade amphib 2 engstroms **22 pilots: 1 IFR current (all IFR rated)** 12 year round: 1500 – 5000 hours, 26 – 52. 8-10 summer: 25 – 35, 1000 – 2000. Turnover 0 this year, usually only 2. All ATP flying the twins. Better than usual because of airlines layoffs.	33 years flying air taxi greatest thing since sliced bread. Scheduled 90% to every town with airport. Based Islander in Ketch. Offices in all towns except Rangel and Sitka. No accidents not on commuter flights since 1990. 3-4 accidents on charter flights, pilot more latitude and no second pilot. Lack of position awareness to shoreline. 67% summer. Avionics: Northern Lights All pilots have GPS, usually Garmin 295s. Downloaded his routes. Not clear how to do it safety. Look at minimums, lower than 500 and 2 for two minutes. Wants higher res graphics then train on when not to use it. , wx cams, ASOS in a table, AAWU graphics, MEL. P-1, All airplanes same, OK one screen on VFR toggling. Create an educated passenger who pilot fears will turn him in for unsafe acts, and provide Dir Ops view of pilot actions – virtual co-pilot. Need good coverage for flight following, put GBTs at all RCOs. Need Coverage at Taku Inlet. Need low route to Kake and Petersburg, 2500 ft. MEA over wide waterway. Would use it now with non-precision approaches – this is the only operational enhancement.

Operator	Aircraft & Pilots	Operations
Lynden Air Cargo **Anchorage** Jerry Vink, Dir Ops Rick Grey Mike Redman	**1 Airplane, IFR** King Air B 200 **2 Pilots** Jim Jansen, Pres. Lynden Corp. Rick Grey, Pres. Lynden Air Cargo	Anchorage to Juneau, 2-3/month. Also to Ketchikan, Sitka, and Skagway.
North Star Trekking **Juneau** Bob Englebrecht, owner (ex Temsco) Jason Culbeth, Ch. Pilot. Michael Lammlein, Dir. Maint. Melita Welling, Dir Gnd Ops 790-4530 No accidents in 4 years of operation. Avionics by Barker.	**3 Aircraft:** 3 AS 350 Bas **6 full time pilots** All IFR rated.	DVFR Charter. Glacier trekking Feb – Apr. 80 - 90% summer.
Pacific Airways **Ketchikan** Mike Rhodes, Pres Josh Murdock, Dir. Maint. Steve Montanus, Dispatch Brad Schrapel, Dir ops Jerry Tayor 225-3500 723-1491 cell	**5 Aircraft** Float Beavers **16 Pilots** 4 year round 27 – 60 age. 2.5 – 24K hrs.	Scheduled 6 locations. Charger 87 nm. 80% over land at some time. 30% of time over water Will install self.
Pacific Wings **Petersburg** Rod Judy 772-4258	**2 Aircraft** C-185s **4 Pilots** 3 full time, 15 yrs 1 part time local, 7 years	Charter, 800 hrs/yr. Tours.
Promech, Inc. **Ketchikan** 1515 Tongas, take ferry Kevin Hack, Owner 225-3845 Tony Dupea, Chief Pilot Mark Easterly, Dir Ops Kerry Trout Dispatcher-Flight follower	**10 airplanes; 2 IFR** 1- C-185, floats 4- DHC – 2, floats 3- DHC – 3T, turbine otters floats 2- DHC – 6, twin otters, IFR, floats Floats year round. **16 – 20 Pilots** 10 – 12 pilots year round, all local pilots, no turnover in 2 years. 6 – 8 seasonal, 2 from previous years. Age: 25 – 63. Hours from 2.5 - 20K+	Commuter scheduled and on - demand, VFR-day. Prince of Wales Island, Misty Fiords National monument, Ketchican. Not interested. Year round. Summer time 5/12 to 9/18.

Operator	Aircraft & Pilots	Operations
Silverbay Logging **Juneau** William Sharkey Errol Champion 874-4100	**12 Aircraft** 3 S61 3 MD369D 4 C-206 1 C-208 Amphib 1 AS350BA **6 Pilots** 4 seasonal	Part 91 logging support Repair station with good avionics shop for the skycrane. Not participate, based at remote locations and only in JNU infrequently.
Skagway Air Service **Skagway, Haines, Juneau** Mike O'Daniel, Owner. 983-2218 Carol Nelson, Office Manager Jill 5 staff in Skagway office, 5 in Haines, 2 in Juneau. Fatal this year of conservative pilot went for a look, IMC.	**11 aircraft: 2 IFR** 6 - PA 32s Cherokee 6 2 – PA 28s Archer 1 - PA 31 Chieftan 1 – BN 2A Islander 1 – PA 34 Seneca **12 pilots** 3-4 full time, 35-70, 3K-15K 8 part time; 22 - ?, 1.7-15K 40% turnover, 0 this year.	Scheduled to Skagway, Haines, Hoona, Gustavus, Juneau. 1.5 hr round trip. Charter. Base at Skagway and Juneau. VFR only, night only for medical emergencies. Pilots salaried, pay for hotel and meals, not fire for canceling, fire for going. As a pilot, impressed; as a manager, scared hell out me.
Sunrise Aviation **Wrangel** Tyler Robinson Dave Gallo 874-2319 sunrise@aptalaska.net	**2 airplanes** 1 A-26 Bonanza wheels 1 C-206 Amphibs VFR D/N **2 pilots** Full time	One demand only, con air. mostly to JNU, 1-4/day. 30/mo to KET. 1-2 Yakutat. Prince Rupert, Stikine river. 80% in 8 month summer. Mostly fly over water. No current or planned IFR. Wants MFD terrain, has G-195s. Very interested.
Taquin (Venture) **Ketchikan** Brien Salazar, President Doug McCart, Ch,Pilot, Dir flight ops. Kevin Roof T.J. Crisocola, Cir Maint. 800 770 8800 225-8800	**6 Aircraft** Float Beavers **10 Pilots** 10 in summer 4 in winter 28-60, 2.5-26K hrs.	4 Beavers contracted to USFS to cabins. Scheduled 150 nm, charter. Flight following
Temsco Helicopters **Ketchikan, Juneau** Charles "Bill" Gale Joe Hicks, Dir Ops Roy Hornbaker, Dir Maint. 225-5141 Juneau: Ron Gile, Maintenance Mgr Gary Stears, lead mech.	**33 Acft, Helos in AK; 0 IFR** 11 MD 500 2 Bell 212 2 AS 350 B3 9 AS 350 B2 9 AS 350 BA all transponder equipped **50-60 Pilots Summer** **7-8 Pilots Winter** P=1 if fit on panel, and FAA address helo issues; will install in all 20 AS 350s.	DVFR Not IFR because cost of equipment testing and pilot currency not recovered by additional revenues. Business since 1984; 1 glacier whiteout accident in 2001 and 3 in 2000. 7 accidents in 10 years. Most important flight following, and SAR, and terrain avoidance. Would want PFD to recover from white out, but may mistake terrain for horizon.

Operator	Aircraft & Pilots	Operations
Ward Air **Juneau** Ed Kiesel, Owner, Dir. Ops. 789-9150 Northern Lights avionics. Accident 4/15/02: very experienced pilot, Beach 18 on takeoff stall departure (possibly engine failure, rumors from others are overloaded aft CG)	**7 aircraft: 0 IFR** 1 Otter floats 3 Beavers amphibs 1 206 DNVFR 1 185 1 C-310 **6 pilots** 4 full-time: ave.10K, 30-48. 2 part-time, locals, 5K. IFR rated but not current.	Charter only. Typical range 100 nm, occn. 250 nm; Yakatat, Ketchikan. 60% business in summer Most have Garmin 195s.
Wings of Alaska **Juneau** Robert "Bob" Jacobsen Mike Stedman, Dir. Ops. Don Bach, Dir. Maint. Carl Remseth, Dispatch 789-9863 Summer schedule begins 5/4. Training begins 4/22, with one week of ground, one week of flight, all on line by 5/12. Plan for 2003: 2/15 -19, ground school; 2/22-26, Capstone school; then flight training and qualification runs.	**17 aircraft: 2 IFR** 2 grand caravans wheel IFR (no boots) 3 207, wheels 1 206, float 5; otters DHC 3, float 5 beavers, float All 28v. **24 Pilots (IFR rated)** 12 full time: 30 – 63, 1K – 22K, ave 4-6K 12 part time, lower time and younger, 25 year olds, 1K; 50% new pilots: 8 new pilots coming in week of 4/15, 4 live in Juneau. 6 qualified in Caravans, 30% qualified in one type only, most in two airplanes (e.g., C-206/207)	Schedules Juneau hub, all within 80 nm, ave. 70nm. Skagway, Haines, Gustavus, Hoonah, Tenakee (float retirement), Angoon native village, float plane. Charters 90% to 100 nm, occasionally to ANC, Prince Rupert, white horse. Ave. Alt. 1500 – 2000; highest 4500-6500. Need glide dist to shore, usually 1700. 70% summer. TIS-B for transients who are unaware of local procedures. Weight important - $$ Shore depiction: G295 better. Want Ice info for IFR. Proposed coverage 80% of flts. Coverage in Taku inlet – 10% flts. Install in their hangar with assist. Do wx analysis to set minima. ND-only OK for CFIT, mid-airs PFD toggle nice, not do 2 IDUs. Not remove eqpt b/c reliability. Need spares at airport. Need MEL from Capstone. Caravans are all elec. FAA do all training, start 10/02. Water tight, leaky old and new.